

Development of Nanostructured VO_x Uncooled Bolometers

Completed Technology Project (2015 - 2016)



Project Introduction

We will develop innovative methods to fabricate vanadium oxide (VO_x) thin films for uncooled microbolometers used in high fidelity land imaging. Whereas commercial off-the-shelf VO_x uncooled microbolometers are inexpensive options for land imaging, their performance is insufficient and has no room for improvement using current fabrication processes. We will fabricate a prototype microbolometer array with improved performance by incorporating the unique VO_x thin films.

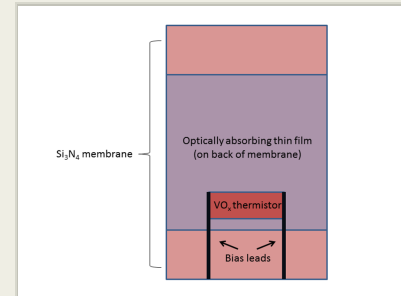
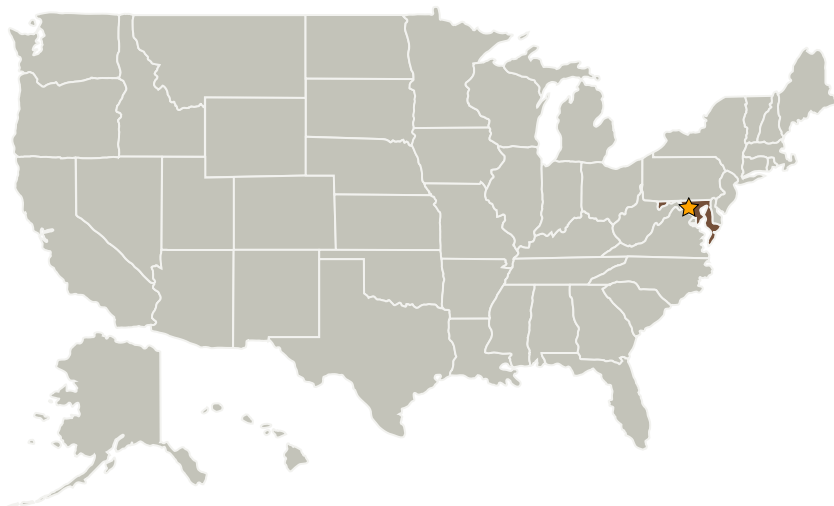
The end goal of this project is to develop proof-of-concept uncooled microbolometers which can be integrated in future thermal instruments engaged in land imaging on future observatories.

Another, secondary, goal of this project is to explore means of increasing the internal thermal time constant of VO_x microbolometers.

Anticipated Benefits

Uncooled microbolometers are prime candidate detectors in thermal imagers for both terrestrial (e.g., Landsat) and planetary applications (e.g., missions to the Jovian lunar environment like JEO/JGO), because they do not require large amounts of power and mass needed for cooling. For this reason, the Earth Science Technology Office (ESTO) has identified these detectors as the subject of multiple studies.

Primary U.S. Work Locations and Key Partners



This is a simplified plan view of a vanadium oxide uncooled microbolometer. The vanadium oxide is the thermistor and the silicon nitride is used to thermally link the thermistor with a heat reservoir.

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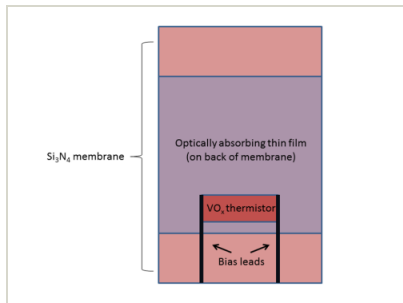
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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland

Images



Schematic of Uncooled Microbolometer

This is a simplified plan view of a vanadium oxide uncooled microbolometer. The vanadium oxide is the thermistor and the silicon nitride is used to thermally link the thermistor with a heat reservoir.

(<https://techport.nasa.gov/image/19080>)

Links

GSC-17613-1
(no url provided)

Project Website:

<http://aetd.gsfc.nasa.gov/>

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Managers:

Matthew J McGill
Terence A Doiron

Principal Investigator:

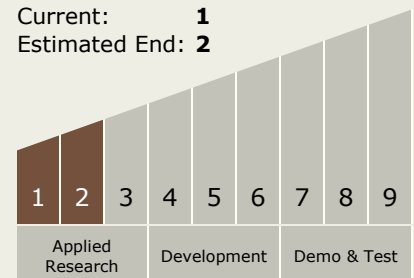
Ari D Brown

Technology Maturity (TRL)

Start: **1**

Current: **1**

Estimated End: **2**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes